

## Computational Finance

INDIVIDUAL ASSIGNMENT, 2023-24

Consider the following market data for bond yields on several dates available in the file `ha_cf_2021.py` on Moodle.

### Tasks:

- a) Build a pandas DataFrame with the data using the dates as columns and year fractions of the tenors as index
- b) Plot the yield curve for each date
- c) Estimate the NSS parameters for each date
- d) Plot the NSS Yield Curve for each date
- e) Plot the evolution of the 9M, 3.5Y, 12.5Y and the 25Y rate over the curve dates (a line for each tenor)
- f) Plot the market data points vs the NSS fit for each date using 5 subplots sharing the y axis (One market date in each subplot)
- g) Make a function that will give the daycount fraction between two dates for either convention `Act/360` or `Act/365` using date strings as inputs.  
Example: `dayCount('15-06-2020', '15-12-2021', 'Act/360')`
- h) Make a function that not only returns the present value of a future investment for a given rate but also prints a custom string. Use it to determine the present value of a payment of EUR 2,430.04 in 5 years at the rate of 5% (Annual compounded rate) and print whatever string you want.  
Example: `pv(amount, rate, maturity, text)`

### PROJECT MILESTONES/REPORTS

The commented code (jupyter notebook or python script) should be submitted no later than November 2nd, 2023 via Moodle or by email to [dduarte@novaims.unl.pt](mailto:dduarte@novaims.unl.pt).